



FESHM 7030: EXCAVATION

Revision History

Author	Description of Change	Revision No. & Date
Ed Crumpley	Initial release Chapter 7030 entitled, Utility Identification & Excavation Permit Program	Revision December 1999
Tom Prosapio	Defined critical and non-critical work (emergency), updated permitting process	Revision July 2002
Russ Alber	Removed Appendix Matrix and removed procedures.	Revision March 2010
Jim Niehoff	Implemented waiver process and developed a map depicting restricted waiver areas.	Revision June 2011

TABLE OF CONTENTS

1.0	PURPOSE	2
2.0	POLICY	2
3.0	DEFINITIONS	3
4.0	RESPONSIBILITIES	4
4.1	Chief Operating Officer.....	4
4.2	Division/Center/Section Head	4
4.3	Construction Coordinator/Task Manager (CC/TM).....	4
4.4	Design Coordinator	4
5.0	PROGRAM DESCRIPTION	4
5.1	Standardized Color for Utility Locators	4
5.2	Design Phase	4
5.3	Construction Phase	5
5.3.1.	Excavation Permit Process	5
5.3.2.	Excavation Activities	6
5.4	Closeout Phase	7
6.0	SPECIAL CONSIDERATIONS	7
6.1	Excavations – Emergency Situations	7
6.2	Restricted Areas, Waiver Prohibited	7

	Fermilab ES&H Manual	FESHM 7030 June, 2011
---	---------------------------------	---------------------------------

1.0 PURPOSE

Safeguarding our workers and utilities is a continuous process that begins in the project planning and design phase and runs through documentation of as-built conditions. This chapter establishes a process to be followed by all divisions and sections when confronted with an excavation as a phase of work.

It is the intent of this chapter to provide guidance regarding actions needed to obtain an excavation permit prior to any activity that penetrates the soil and complementary procedures when operating under FESHM 7010 (Subcontractor Construction Safety Program) or FESHM 7020 (Subcontractor Safety- Other than Construction) and FESHM 2060 (Hazard Analysis for Fermilab Employees). This chapter is not a primer on how to do a safe excavation. Standards to follow when opening an excavation can be found in the Code of Federal Regulations 29CFR1926 Subpart P.

2.0 POLICY

Existing utility locations will be considered during the design phase of all proposed work that involves excavation. Where appropriate, designs will be modified to minimize interferences with existing utilities.

Procurement documents will clearly spell out Fermilab's expectations and requirements regarding excavation activities.

A completed permit is required before the start of any excavation activity and must be kept current when an excavation is underway. The Facilities Engineering Services Section (FESS) will maintain a policy and procedure for issuing such permits. See FESS Standard Operating Procedure – Appendix A.

Lockout/Tagout (LOTO) procedures will be applied before excavating in the proximity of buried electrical cable and/or high-pressure gas lines. Special planning and precautions must be taken and the Hazard Analysis (HA) must be approved by the Chief Operating Officer or designee when deactivation of an existing electrical cable or high-pressure gas line in the area of an excavation is not possible.

As found and as-built, utility information will be gathered and stored in a retrievable system. The preferred method for storing this information is Facilities Engineering Services Section Geographic Information System (GIS). At a minimum, the GIS map depicting the restricted buffers around beam lines and solid waste areas must be reviewed by the Subcontractor's Safety Subcommittee (S-3) and Radiation Safety Subcommittee (RSS) every first quarter of every calendar year.

	Fermilab ES&H Manual	FESHM 7030 June, 2011
---	---------------------------------	---------------------------------

3.0 DEFINITIONS

- **Competent Person** - One who is capable of identifying existing and predictable hazards in the surroundings, or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them.
- **Construction Coordinator (CC)** - A person specifically assigned to oversee the work of a construction subcontract for conformance to the subcontract agreements/documents. Construction Coordinators serve as the primary construction point of contact between the Subcontractor and the Laboratory.
- **Design Coordinator** – A person assigned the responsibility for assembly of complete design documents for the purpose of bidding and/or construction
- **Electric Cable** – any buried medium or high-voltage (120/208V system or higher) electrical cable whether direct buried, in conduit or in a reinforced concrete duct bank.
- **Excavation** - Any man-made cut, cavity, trench, or depression in an earth surface, formed by earth removal. This includes directional drilling but does not include farm tillage operations.
- **Fermi-JULIE** – The system established in Fermilab to act on requests for locating buried utilities.
- **Geographic Information System (GIS)** – Is a system that captures, stores, manages, and presents geographic data such as utilities, buildings, land use, and other special infrastructure. The GIS is considered the source documentation of utilities and is used in conjunction with the Fermi-JULIE system. The URL can be found at: <http://fess.fnal.gov/gis/index.html>
- **High-Pressure Gas Service** – for purposes of this chapter is defined as any gas service at or above 100psi.
- **Potholing** – Potholing is the practice of digging a test hole to expose underground utilities to determine the horizontal and vertical location of the utility. Potholing methods include:
 - Hand Digging - Hand digging is the method of excavating a pothole by manual means with hand-held, non-mechanical equipment such as a shovel.
 - Vacuum Excavation - Vacuum excavation consists of air or water pressure to break up the soil and a vacuum device to collect the spoil
- **Task Manager (TM)** – A division/center/section-designated individual specifically assigned to oversee and direct a work activity. The Task Manager has primary responsibility for developing hazard assessments for the work, as prescribed in FESHM 2060 – Work Planning and Hazard Analysis. An approved TM list indicating individual experience and competency to direct specific work activities can be found at: <http://esh.fnal.gov/xms/Audience-Pages/TM-CC-SC>

	Fermilab ES&H Manual	FESHM 7030 June, 2011
---	---------------------------------	--------------------------

- **Waiver** – A written relinquishment of executing the excavation process and permit, typically prepared by TM/CC.

4.0 RESPONSIBILITIES

4.1 Chief Operating Officer

- The Chief Operating Officer or his designee must sign the Excavation Hazard Analysis when electrical cables and/or high-pressure gas service within 18” either side or crossing an excavation cannot be de-energized or depressurized.

4.2 Division/Center/Section Head

- Implementation of the requirements of this chapter for those construction activities managed by his/her staff.
- Assignment of a qualified TM/CC.

4.3 Construction Coordinator/Task Manager (CC/TM)

- Submit Excavation Permit
- Submit as-built existing and/or new utility locations to the GIS system.
- Assure a competent person signs the excavation permit.
- Obtain Chief Operating Officer approval of the HA if work near energized electrical cables or high-pressure gas lines is anticipated.
- Provide supervision during live work activities

4.4 Design Coordinator

- Verify proximity of excavation to accelerator enclosures and Solid Waste Management Units (SWMU’s) as well as any special delineated areas.
- Incorporate as-built existing and/or new utility locations into the design drawings into the Fermilab’s GIS system.

5.0 PROGRAM DESCRIPTION

5.1 Standardized Color for Utility Locators

Paint, flags, or other marking schemes will use color as specified on the permit form.

5.2 Design Phase

When it is recognized that completion of a task will include excavation, the design team will identify existing underground utilities and incorporate reasonable accommodations into the

	Fermilab ES&H Manual	FESHM 7030 June, 2011
---	---------------------------------	---------------------------------

design to minimize the likelihood of damage. The TM is responsible for any and all required engineering/design activities for T&M activities. Design Coordinators are responsible for the engineering/design activities associated with fixed-price construction work. The design team will identify existing utilities using some or all of the following:

- Existing utility maps
- Previous design and as-built documents, including; accelerator enclosure clearance zones, radiation shielding assessments, and delineated special areas such as Solid Waste Management Unites (SWMU's)
- Fermi-JULIE location of utilities
- Test holes
- On-site physical review
- Corporate knowledge

The design team will incorporate all known utility information into design and construction drawings.

Contracts for projects including excavation activities shall require:

- An Excavation Permit before beginning any excavation.
- Field marking of the proposed excavation zones and maintenance of the locator markings.
- Notification to Fermilab of any damage to existing utilities.
- Submission of as-built drawings with utility line coordinates and elevations for inclusion into Fermilab's GIS System.

5.3 Construction Phase

5.3.1. Excavation Permit Process

1. The TM/CC will prepare an application for excavation permit identifying the area and depth (volume) of the excavation. It is helpful to attached a sketch or drawing either form the GIS system or other program indicating the approximate location of the excavation.
2. If practical, the TM or subcontractor shall mark the perimeter of the proposed excavation in the field using stakes and tape, white flags, or white paint.
3. An excavation permit will be issued when all location marks are completed.

There may be times when it is known with certainty that the volume where an excavation is being considered is free of buried utilities. This certainty may have been reached by various means including corporate memory of construction of the facility, review of as built information or other means. The TM/CC may provide a waiver in writing that such area is devoid of buried utilities and/or corporate knowledge. This waiver must be based on corporate knowledge and shall be attached to the HA, in effect, will become the permit. This

	Fermilab ES&H Manual	FESHM 7030 June, 2011
---	---------------------------------	---------------------------------

waiver cannot be executed if the area in question is within the special considerations as delineated in Section 6.0 of this chapter. Before any waiver is considered, the GIS web map shall be reviewed to verify that the proposed excavation does not conflict with these restricted areas.

5.3.2. Excavation Activities

1. The TM/CC shall review and sign the excavation permit with the subcontractor competent person.
2. The excavation permit & sketch must be available for reference at the excavation site.
3. During the excavation activity, the TM/CC will verify that the existing and new utilities are documented and that the location flags are removed after project completion.
4. The TM/CC is to conduct a preparatory meeting prior to the beginning of any excavating activity. Suggested agenda items include:
 - Review permits, HA, LOTO, disablements
 - Review shop drawings, materials on hand
 - Confirm Fermi-JULIE markings are legible
 - Discuss routing of existing utilities and interferences
 - Confirm extent of excavations
 - Establish inspection stop points
 - Coordinate location of actual utility positions
 - Establish schedule for any further meetings

Suggested attendees include:

- TM/CC
 - Subcontractor superintendent
 - Excavating foreman
 - Machine operators
 - Subcontractor safety representative
 - ESH-SEP
5. Electrical cables and/or high-pressure gas service in the area of the excavation will be de-energized/depressurized and LOTO procedures implemented. The Chief Operating Officer or his designee must sign the Excavation Hazard Analysis when electrical cables and/or high-pressure gas service is within 18" either side or crossing an excavation cannot be de-energized or depressurized. Note: This requirement is waived when performing hydro-vacuum excavation method.
 6. TM/CC presence is strongly recommended at the excavation site when:

	Fermilab ES&H Manual	FESHM 7030 June, 2011
---	---------------------------------	--------------------------

- a. Excavation activity first begins or enters a new phase.
 - b. Excavating within 5' of markings of energized electrical cable and/or high-pressure gas lines.
 - c. Excavating under existing utilities.
 - d. Excavating across roadways
 - e. Pot-holing existing utilities.
7. Any incident involving damage to existing utilities shall be reported and investigated per the procedures in FESHM 3020, "Incident Investigation".

5.4 Closeout Phase

At the completion of each excavation activity, the TM/CC will submit as-found and as-built information to the Fermi-JULIE and GIS System with locations and depths of existing and installed utilities.

6.0 SPECIAL CONSIDERATIONS

6.1 Excavations – Emergency Situations

There may be instances where a system, utility or facility failure requires an immediate excavation to make repairs or where timeliness is of the utmost importance to preserve life or property. Applying the requirements of this chapter when an emergency arises may prove to be unfeasible when speed of repairs is essential. Under these circumstances, the TM/CC is authorized to waive the requirements of this chapter. However, the TM/CC shall take special care to identify high-risk utilities before proceeding.

6.2 Restricted Areas, Waiver Prohibited

Excavation on or within buffers of beam-lines, archeology sites, solid waste areas shown on GIS link are restricted and therefore; waivers are prohibited.